International Space Station continues operations, mission research

By Linda Singleton

The following is the second in a series of stories on NASA's Return to Flight efforts. This installment focuses on the International Space Station and its readiness for the Shuttle fleet's Return to Flight.

The International Space Station is "ready to fully support the Shuttle missions as soon as they return to flight," said Mike Suffredini, ISS Operations Integration Manager. In the meantime, the ISS Program Office works around the clock to find solutions to the current challenges of a two-person crew and the highly technical assembly missions that lie ahead.

During a Return to Flight media briefing Sept. 16, Suffredini joined ISS Program Manager Bill Gerstenmaier and ISS Program Scientist Don Thomas to present an overview of their current and future priorities.

In regard to space-based research, Thomas outlined four new research strategies that are now being put into action for the ISS:

- Complete the current experiments onboard the ISS.
- Perform additional experiments on samples that can be reused, enabling the crew to gain additional valuable data for the principal investigators.
- Develop smaller, lighter payloads of fast-track experiments, such as fluid dynamics experiments, which can be launched aboard Russian Progress vehicles.
- Maximize international cooperation. For example, a protein crystal growth experiment (the Granada Crystallization Facility) was developed in Spain with a principal investigator from the Japan Aerospace Exploration Agency. It is contained in a European Space Agency (ESA) facility, and it will be launched on a Russian Soyuz and stored in U.S.-built units.

Now onboard Station, Expedition 8 Commander and NASA ISS Science Officer Michael Foale will oversee more than 200 hours of scientific research with the facilities and samples already on board. Additional experiments are currently being evaluated and prepared to take advantage of the available cargo space on the Progress vehicle.

New United States experiments to be conducted during the Expedition 8 increment include:

- Cell Biotechnology Operations Support system, which is used to grow three-dimensional tissue that retains the form and function of natural living tissue, a capability that could hold insights in studying human diseases, including various types of cancer, diabetes, heart disease and AIDS.
- Education Payload Operations, which include three educational activities that will focus on demonstrating science, mathematics, technology, engineering or geography principles.
- Group Activation Packs - YEAST, which will evaluate the role of individual genes in the response of yeast to space flight conditions. The results of this research could help clarify how mammalian cells grow under microgravity conditions and determine if genes are altered.

When asked how much he thought that the Station's scientific mission would be advanced during Expedition 8, Foale said that he thought it would be "advanced quite significantly; no less than before Columbia." He called that assertion "a bold statement, but it's supported by the fact that I have many investigations to carry out onboard the Station."

The primary research objective to take place once the Shuttles return to flight will be the installation of three new research racks in the Destiny Module: Human Research Facility-2 (HRF-2); Minus Eighty Degree Laboratory Freezer for ISS (MELFI), built by ESA; and the Window Observational Research Facility (WORF).

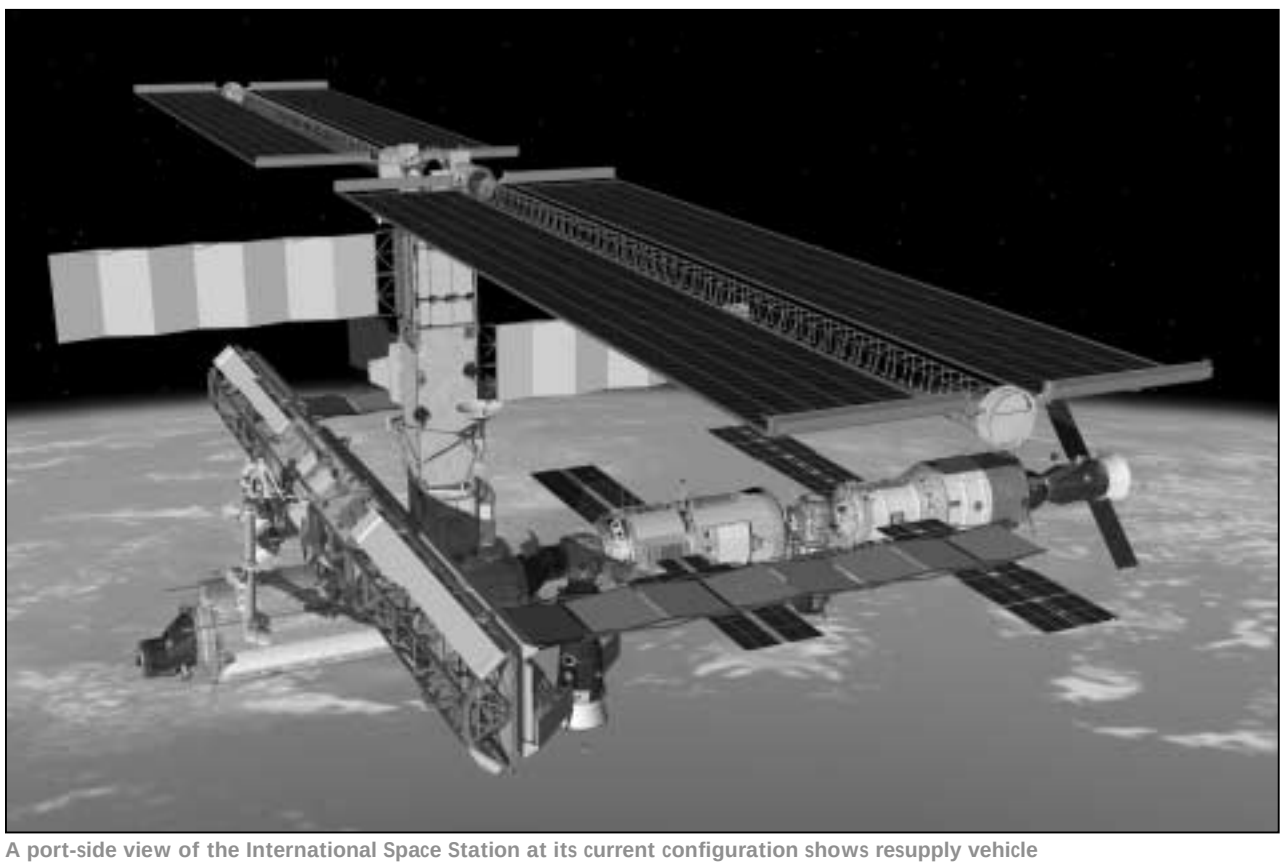
HRF-2 will enable scientists to monitor the mass and weight of crewmembers while on orbit, as well as conduct metabolic studies and monitor pulmonary functions. Data collected from these studies will help them identify the overall effects of long-duration spaceflight. MELFI is a minus 80 degrees Celsius freezer that will retain blood, urine and saliva samples until they can be returned to Earth for further study following each mission. WORF is a world-class window observation facility that eliminates glare – resulting in even better imagery taken from Station – and can be used by researchers on the ground and orbiting crews alike.

In terms of Station assembly, seven flights must be completed before Node 2 can be attached to the ISS. However, Gerstenmaier said no schedule pressures will be placed on the Shuttle program to expedite any of these assembly missions. "The first two Shuttle flights will be focused on getting all the new processes and routines put in order," he said.

The 12-A.1 assembly mission will be one of the most challenging to date in terms of managing the power and thermal systems. During this mission, the crew will conduct its first-ever major power-down of half of the Station and then initiate a power-up sequence to install and move the massive solar arrays.

Other changes to ISS operations, which are currently being implemented, include separating crew from cargo missions, utilizing more disposable food and storage containers that do not need to be returned to Earth and switching some of the payload mission schedules.

"Overall, we're in very good shape on Station in regard to crew rotation plans, maintenance schedules and consumables," Suffredini said.



A port-side view of the International Space Station at its current configuration shows resupply vehicle Progress 12 docked to the aft end of the Service Module.

Courtesy of JSC's Visual Communications Lab

The Expedition 8 crew, Flight Engineer Alexander Kaleri (top) and Commander Michael Foale, launched to the International Space Station on Oct. 18.

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iss007-17762